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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/829,169	04/09/2001	Stephen C. Vincent	P04860US0	8267

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MCKEE, VOORHEES & SEASE, P.L.C.
801 GRAND AVENUE
SUITE 3200
DES MOINES, IA 50309-2721

EXAMINER	
MCDONALD, RODNEY GLENN	
ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

AS-13

Office Action Summary	Application No. 09/829,169	Applicant(s) Vincent
	Examiner Rodney McDonald	Art Unit 1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *Nov 13, 2002*

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-5 and 15* is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-5 and 15* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☐ All b) ☐ Some* c) ☐ None of:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____
4) ☐ Interview Summary (PTO-413) Paper No(s). _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11-13-02 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Minami et al. (U.S. Pat. 4,777,583).

Figure 2 is representative of the invention. In Fig. 2 numerals 1, 2, 3, 4, 5, 6 represent a ceramic substrate, a glaze layer, ***a heat-generating resistor***, a common electrode, an individual electrode and a protecting film, respectively. (Column 3 lines 55-60) A known alumina ceramic is used as the ceramic substrate. (Column 3 lines 60-61) The glaze layer 2 is partially formed on the ceramic substrate 1. (Column 4 lines 5-6) The ***heat-generating resistors 3*** and ***electrodes 4 and***

5 are formed to have shapes shown in Fig. 1. A number of independent rows of heat-generating resistors 3 are formed on the glaze layer 2 at small intervals t in the longitudinal direction, and electrodes 4 and 5 having a width W are formed on the glaze layer 2 at small intervals t in the longitudinal direction. (Column 4 lines 25-31) ***Titanium***, chromium silicate, tantalum silicate, and tantalum nitride may be used ***as the heat-generating resistor 3*** and it is generally preferred that the thickness of the heat-generating resistors 3 be 0.05 to 0.5 microns. Aluminum or gold is used as the material constituting the ***electrodes 4 and 5***, and it is preferred that the thickness of the electrodes 4 and 5 be 0.5 to 2.0 microns. (Column 4 lines 63-68; Column 5 lines 1-2) A ***protecting film 6*** may be formed on the heat generating resistors 3 and the electrodes 4 and 5, as shown in Fig. 2. A material excellent in the oxygen barrier property, the thermal conductivity, the electrically insulating property and the abrasion resistance, such as ***tantalum pentoxide***, is used for protecting film 6, and the thickness of the protecting film 6 is ordinarily 1.0 to 8.0 microns. (Column 5 lines 45-52)

The differences between Minami et al. and the present claims is the depositing of the layers is not discussed, where electrodes 4a and 5a are terminations is not discussed and the reduction of failures due to electrolytic corrosion under powered moisture conditions is not discussed.

As to the depositing the layers are deposited in order to achieve the structure of Figure 2 and must be deposited in that order such that the layers overlay one another. (See Figure 2)

As to the terminations since 4a and 5a are electrodes they are the terminations of the structure which are on the ends of the metal film as seen in Figs. 1 and 2. (See Figures 1 and 2)

As to the reduction of failures due to electrolytic corrosion uder powered moisture conditions, it is believed that since tantalum pentoxide serves as a protective film it will protect the layers form moisture and corrosion. (See Column 5 lines 45-52).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have formed a thin film resistor with moisture barrier layer as taught by Minami et al. because it allows for utilizing resistors to form thermal heads.

4. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Minami et al. (U.S. Pat. 4,777,583) as applied to claim 1 above, and further in view of Young (U.S. Pat. 4,002,542).

The differences not yet discussed is the depositing by sputtering of the tantalum pentoxide layer.

Young teach in Fig. 1 a dielectric substrate 10 to which is applied a non-tantalum electrically conductive film electrode 12. The material of the dielectric substrate 10 may be any suitable dielectric material such as glass, ceramic, glass-ceramics or the like. The material of the electrode 12 may be any electrically conductive material which is compatible with tantalum oxide as well as compatible with the method of applying a film of tantalum oxide thereto, such as for example as aluminum, chromium nichrome, or the like. (Column 2 lines 20-30)

The dielectric substrate-electrode composite of FIG. 1 is disposed on substrate holder 16 while a target of tantalum oxide 22 is disposed on target holder 20 within housing 18. Housing 18

is then sealed and a predetermined desired vacuum is drawn therein. The amount of vacuum drawn depends on the materials involved in the sputtering as well as, to some extent, on the electrical parameters of the various parts of the apparatus. A quantity of inert ionizable gas is then introduced into housing 18 reducing the vacuum to a predetermined desired level. One familiar with the art can readily select a suitable level of vacuum for a specific set of parameters. The ionizable gas may be any suitable inert ionizable gas such as argon, xenon, nitrogen, or the like. A plasma is then initiated by means of filament cathode 24, anode 26, and dc power sources 36 and 37, while suitable r-f energy is applied to target material 22 by r-f power source 38. If desired, magnetic coils 40 and 42 may be energized to focus the plasma. Under these described conditions, ***target material 22 will be caused to sputter*** and be applied over electrode 12 on substrate 10. When desired, a mask may be interposed over electrode 12 to pattern the application of the target material on electrode 12. Such a mask is not shown, however, its nature will be readily understood by one familiar with the art. ***After a suitable sputtering period of time, a layer or film 44 of target material 22 will be applied to electrode 12 as illustrated in FIG. 3. As heretofore described, the target material for thin film capacitors will be tantalum oxide, Ta2O5,*** which will comprise the capacitor dielectric. ***Although the proceeding describes a process of r-f triode sputtering from a Ta2O5 target, layer or film 44 may be applied by reactive sputtering from a tantalum target, by electron beam evaporation from a Ta2O5 target, by r-f diode sputtering from a Ta2O5 target, or by like methods.*** (Column 2 lines 57-68; Column 3 lines 1-24)

The motivation for depositing the tantalum pentoxide layer through sputtering is that it allows for depositing a film without reduced electrical series resistance. (Column 1 lines 32-35)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Minami et al. by sputter depositing the tantalum pentoxide film as taught by Young because it allows for depositing a film without reduced electrical series resistance.

5. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Minami et al. as applied to claim 1 above, and further in view of Oki Electric Ind Co Ltd (Japan 52-3196).

The differences not yet discussed is the resistance layer being NiCr.

Minami et al. recognize that resistance layers to be used can be Ti and tantalum nitride, etc. (See Minami et al.)

Oki Electric Co. Ltd. Also recognize that resistance layers can be tantalum nitride, NiCr, etc. (See Oki Electric Co. Ltd. Abstract)

The motivation for replacing Minami et al.'s resistive layer with NiCr of Oki is that it allows for providing a layer with the required resistance feature. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art to have modified Minami et al. by replacing their resistive layer with a layer of NiCr as taught by Oki Electric Co. Ltd. because the resistive layers are art recognized equivalents.

6. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over in Fuyama et al. (U.S. Pat. 4,617,575) view of Sato (Japan 61-27264) and Oki Electric Ind Co Ltd (Japan 52-3196).

Fuyama et al. teach in Fig. 1 ***a heating resistor 110*** of chromium silicon alloy having a thickness of 0.1 microns and first layer conductor 120 consisting of a chromium layer 10 and an aluminum layer 20 are formed in a predetermined pattern on an alumina substrate 100 with a glaze layer as an insulating substrate. Then, a protective film 140 made of silicon dioxide and serving as an insulating film at the same time is formed thereon throughout the entire surface by ***sputtering*** or plasma CVD so far used, preferably, to a thickness of about 3 microns. Then, a silicon nitride film 150 is formed only on the heating resistor 110 by mask plasma CVD. Crack formation can be prevented by the release of the stress on the silicon nitride. (Column 4 lines 19-35) ***Tantalum pentoxide*** can be used alternatively to the silicon nitride. (Column 3 lines 30-33)

The differences between Fuyama et al. and the present claims is that depositing the films is not discussed, the resistive film being a metal film is not discussed and the reduction of failures due to electrolytic corrosion under powered moisture conditions is not discussed.

Sato teach in preparing a thermal head, ***an abrasion resistant layer 6 being a protective layer comprising tantalum pentoxide*** is formed in a thickness of about 5 microns by a sputtering method and heat-treated in air or a nitrogen atmosphere. This heat treatment is performed at a temperature equal to or higher than a peak temperature generated by the pulse driving or a heat generating resistor 2 to make it possible to impart a good characteristic for reducing the change

ratio in the resistance value of the heat generating resistor 3. The relation of the resistance change ratio of thus formed thermal head and a pulse number is reduced in variation and stabilized over a long period of time and, because a heat treatment process is performed ***after each layer was formed by a sputtering method***, there is no interruption in the process and manufacturing cost can be reduced. (See Abstract)

The motivation for depositing each layer by a sputtering method is that it allows for no interruption in the manufacturing cost. (See Abstract)

Oki Electric Co. Ltd. teach that ***resistance layers can be metals such as W, NiCr***, etc. (See Oki Electric Co. Ltd. Abstract)

The motivation for utilizing resistance layers of metal is that it allows for providing a layer with the required resistance feature. (See Abstract)

As to the reduction of failures due to electrolytic corrosion under powered moisture conditions, since the tantalum pentoxide can be used as a protective layer it would protect against electrolytic corrosion. (See Fuyama et al. Column 3 lines 30-33)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Fuyama et al. by depositing the layers by sputtering as taught by Sato and to have utilized metals as the resistance layers as taught by Oki Electric Co. Ltd. because it allows for no interruption in the manufacturing cost and for providing a layer with the required resistance feature.

Response to Arguments

In response to applicant's argument that Minami is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Minami is annalogous art because Minami relate to a thin film resistor material which is required by Applicant's claims. Structurallly Minami's layers are the same as Applicant's layers.

In response to the argument that Minami does not teach depositing the metal film resistive layer on the thin film resistor substrate, it is argued that Minami substrate supports a thin film resistive layer and therefore Minami does teach depositing the metal film resistive layer on a thin film resistor substrate. (See Minami discussed above)

In response to the argument that Minami does not teach attaching a thin film resistor termination on each end of the metal film resistive layer, it is argued that Minami by depositing electrodes 4a and 5a suggest attaching terminations on the end of the resistive layer. The terminations are electrodes 4a 5a: (See Minami discussed above)

In response to the argument that Minami does not recognize utilizing a moisture barrier layer to reduce failures due to electrolytic corrosion under powered moisture conditions, it is argued that since Minami suggest a protective layer that such a protective layer will protect agianst corrosion given that the layer is a protective layer. (See Minami discussed above)

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

In response to the argument that Young does not teach reducing failures of a resistor due to electrolytic corrosion under powered mositure conditions, it is argued that Minami teach a protective layer and that the protective layer would serve to protect unerlying layers from corrosion. (See Minami discussed above)

In response to the argument that Oki does not teach a tantalum pentoxide layer deposited on the resistance layer or recognize the advantage of reducing failures of a resistor due to electrolytic corrosion under powered moisture conditions, it is argued that Minami teach utilziing tantalum pentoxide and Minami recognize that tantalum pentoxide can be used for protection. (See Minami discussed above)

In response to applicant's argument that Fuyama and Sato are nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977

F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Fuyama and Sato are analogous art because the relate to thin film resistor deposition. (See Fuyama and Sato discussed above)

In response to the argument that Fuyama does not teach utilizing tantalum pentoxide as a moisture barrier for reducing failures due to electrolytic corrosion under powered moisture conditions, it is argued that Fuyama teach that tantalum pentoxide can protect from crack formation thus suggesting protection properties of the tantalum pentoxide film. (See Fuyama discuss above)

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney McDonald whose telephone number is 703-308-3807. The examiner can normally be reached on M-Th from 8 to 5:30. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen, can be reached on (703) 308-3322. The fax phone number for the organization where this application or proceeding is assigned is 70-872-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Rodney G. McDonald

RODNEY G. MCDONALD
PRIMARY EXAMINER

RM

November 25, 2002